My Optical Media Buying Guide, 2024 Edition

(For Archive, Backup & Data 'Buffs')

Based on this year's foray a little too far down the rabbit hole of optical media….

Daniel Rosehill
30/01/2024

1: Please share what you know!
2: My best attempt at offering accurate information.

But …WTH would anyone want to burn discs in 2024!?

(Other variations: Haven't you heard of the cloud / NASes / LTO / HDDs!?)

Pretty objective reasons why optical media sucks as a storage option:

- On a cost-per-TB basis it's a pretty bad deal (at least versus VTO and HDD)
- The process of committing data onto disc is time-consuming and annoying
- The world of optical media seems to be frozen in time in the noughties. There has been limited innovation in the space since. Specific to Linux users: the burning software sucks.
- Optical's capacity sucks.
- Discs take up room. Lots of discs could take up lots of room.

But … optical media has one redeeming feature for archival and cold (offline) data storage

1: It’s *relatively* impervious to bit rot (only certain types!)

2: Forms of optical media have been developed that are supposed to be totally impervious to bit/data/disc rot and guarantee data longevity of 100 years +

Weirdly, it’s way better at cold/offline storage than way more modern media!

- HDDs store data by magnetism. Great. Until the disc loses its magnetic charge (in as little as a couple of years)
- SSDs store data through electrical charge held in microscopic cells. Great. Until those cells lose their charge. (Ditto: flash memory)
- LTO: don’t mistake cheapness for longevity. Data rot in 30 years.
- Optical: lots of 50 year products. Some 100 year products. 1 x 1,000 year product.

It’s also the “old” way of creating offsite backups!

- Sucky internet + big data volumes = cloud backups (for offsite) aren’t feasible
- Putting a CD/DVD/BD in the post = very feasible
- You can mirror concepts like ‘Iron Mountain’ but without needing to pay an external provider (you just need two places to store discs)

The other semi-reasonable reason that optical media still enjoys usage:

- WORM is actually a feature!
- Think: ransomware protection!
- But also: immutability!
  - Think: financial filings. If you can't write to the disc, you can't change the data!
- Compliance: data you need to keep but will probably never actually need (old client files, CCTV footage, etc). Stick it all on some big Blu Rays and forget about it.

There are other people who use and like them

- Videophiles still collect optical.
- Some people just like them for nostalgia reasons.
- If you have small pockets of data you really care about (videos, photos, files) … optical still makes sense.
  - You generate lots of video data and don’t want to have to keep upgrading the volume on your NAS

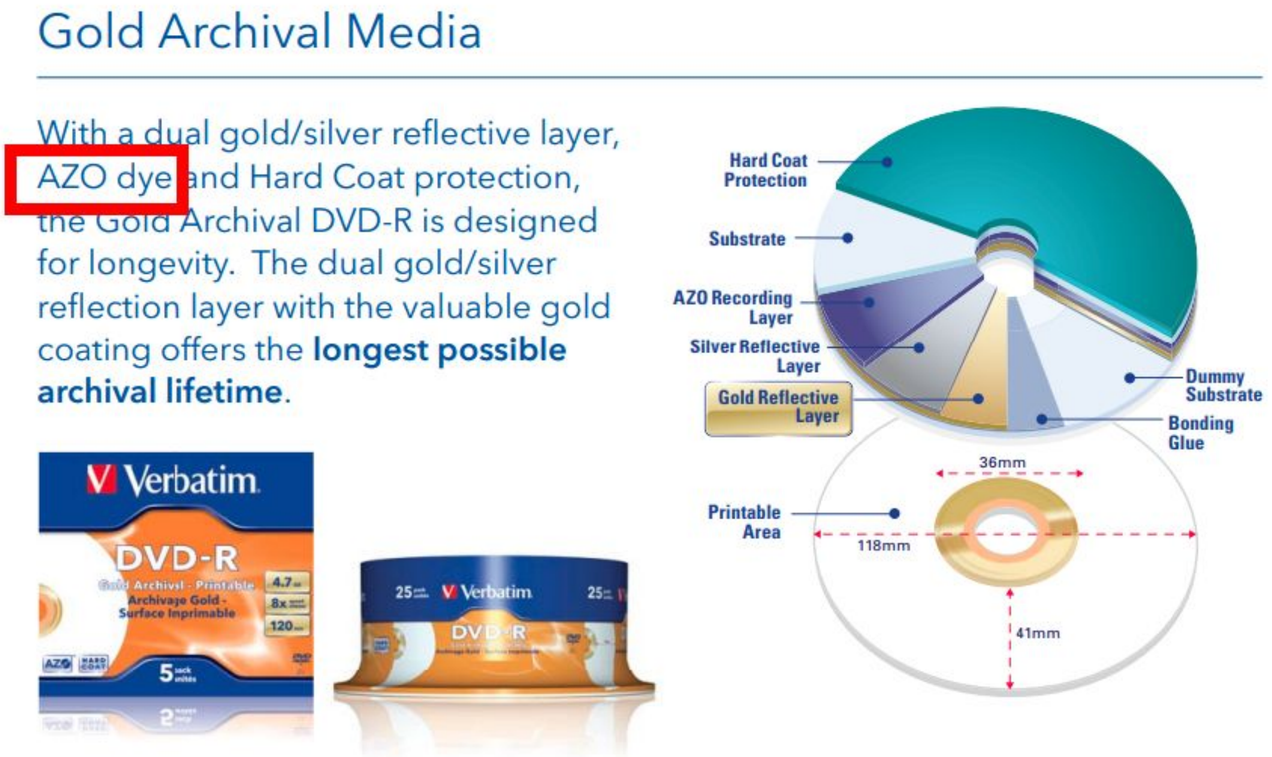
I want to use optical media for archive (note: archive ≠ backup).

What should I buy?

CDs & DVDs: Look For Archival Products. But … Personally I’d Skip Them Altogether

Verbatim “Archival Grade” (UltraLife) > Verbatim DataLifePlus (Source: Verbatim)

Gold reduces corrosion for a long time but the dyes are still organic (plus way less data storing capacity)



Gold Archival Media

With a dual gold/silver reflective layer, AZO dye and Hard Coat protection, the Gold Archival DVD-R is designed for longevity. The dual gold/silver reflection layer with the valuable gold coating offers the **longest possible archival lifetime**.

Hard Coat Protection
Substrate
AZO Recording Layer
Silver Reflective Layer
Gold Reflective Layer
Dummy Substrate
Bonding Glue
36mm
Printable Area
118mm
41mm
Verbatim
DVD-R
Gold Archival - Printable
Archivaje Gold - Surface Imprimable
4.7
8x
120
AZO
HARD COAT
5
25
Verbatim
DVD-R

Reasons to use CDs and DVDs over BDs

- The hardware is cheaper
- In certain cases: the hardware is more reliable (Blu Ray = ‘harder’)
- Slice up archival data into thinner ‘slices’
- Gold discs look awesome!

The CII Actually Likes Them

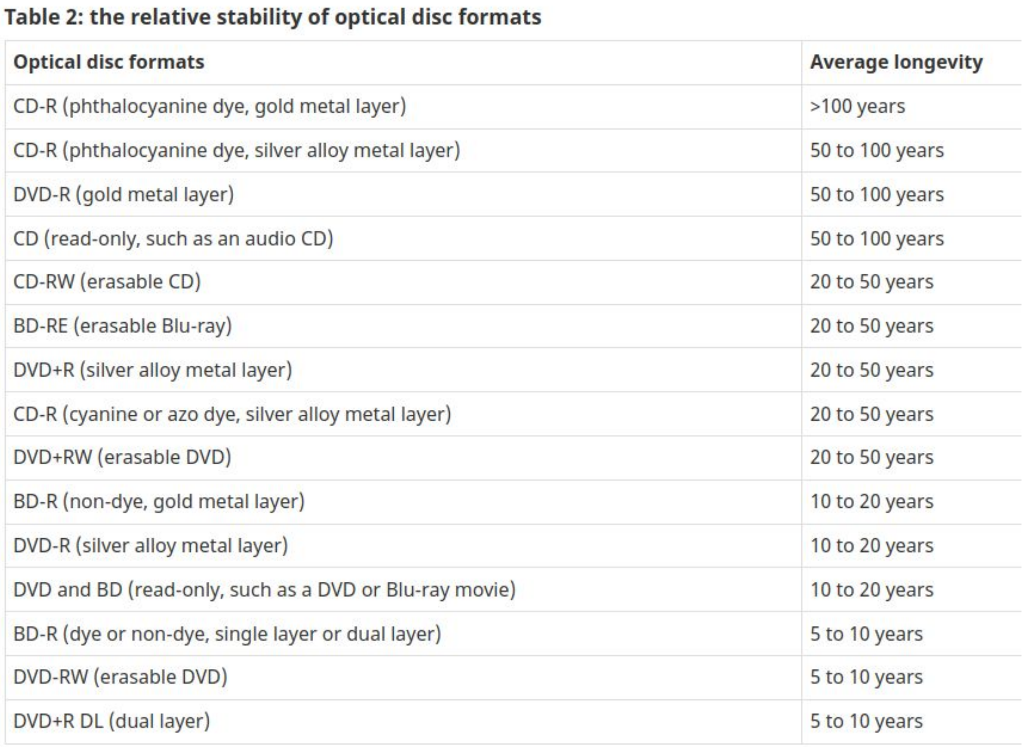


Table 2: the relative stability of optical disc formats

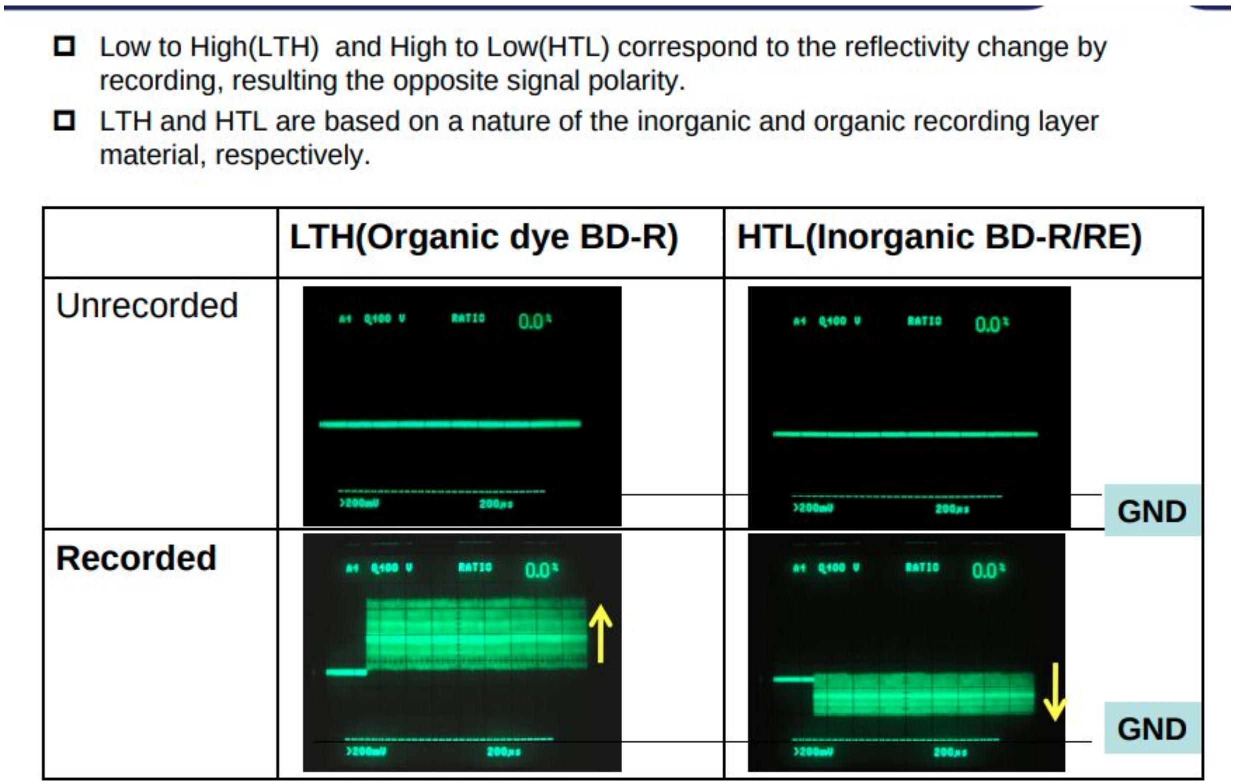
Optical disc formats	Average longevity
CD-R (phthalocyanine dye, gold metal layer)	>100 years
CD-R (phthalocyanine dye, silver alloy metal layer)	50 to 100 years
DVD-R (gold metal layer)	50 to 100 years
CD (read-only, such as an audio CD)	50 to 100 years
CD-RW (erasable CD)	20 to 50 years
BD-RE (erasable Blu-ray)	20 to 50 years
DVD+R (silver alloy metal layer)	20 to 50 years
CD-R (cyanine or azo dye, silver alloy metal layer)	20 to 50 years
DVD+RW (erasable DVD)	20 to 50 years
BD-R (non-dye, gold metal layer)	10 to 20 years
DVD-R (silver alloy metal layer)	10 to 20 years
DVD and BD (read-only, such as a DVD or Blu-ray movie)	10 to 20 years
BD-R (dye or non-dye, single layer or dual layer)	5 to 10 years
DVD-RW (erasable DVD)	5 to 10 years
DVD+R DL (dual layer)	5 to 10 years

Professional Line
Product description:
Professional Line CD-R 700MB|80min 52x speed, gold-plated, unprinted/blank, archival grade

Canadian
Conservation
Institute

Institut
canadien de
conservation

Blu Ray: Getting Beyond The HTL vs LTH Debate



- ☐ Low to High(LTH) and High to Low(HTL) correspond to the reflectivity change by recording, resulting the opposite signal polarity.
- ☐ LTH and HTL are based on a nature of the inorganic and organic recording layer material, respectively.

	LTH(Organic dye BD-R)	HTL(Inorganic BD-R/RE)
Unrecorded		
Recorded		

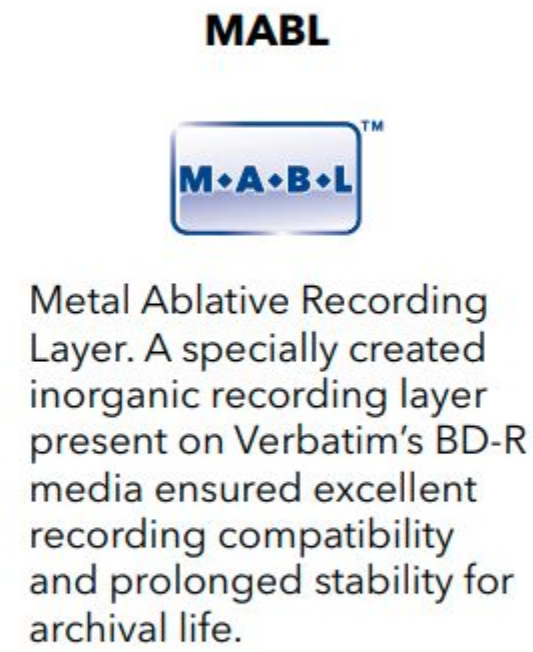
Verbatim
MITSUBISHI KAGAKU MEDIA
フルハイビジョン録画対応
1回録画
BD-R
LTH TYPE
地デジ
180分
25 GB
1-4
【安心のハードコート】
記録層をダメージから強力に守る
Blu-ray Disc
10枚
FULL HD

Verbatim
BD-R
LTH Type
Blu-ray Disc
25 GB Go
2x speed vitesse

The Short And Sweet Summary

- LTH was an experiment to try to make Blu Ray production cheaper by mimicking the process of CDs and DVDs so existing production lines could be quickly and inexpensively adopted.
- **Verbatim told me: we only make BD-R HTL!**
- You can still find LTH discs floating about but it seems (to me) as if it’s reasonably safe to say that the industry largely abandoned this technology

Verbatim HTL BD-R Uses MABL



MABL

M•A•B•L™

Metal Ablative Recording Layer. A specially created inorganic recording layer present on Verbatim's BD-R media ensured excellent recording compatibility and prolonged stability for archival life.

More Verbatim terms made easy

My definitions!

HARD COAT

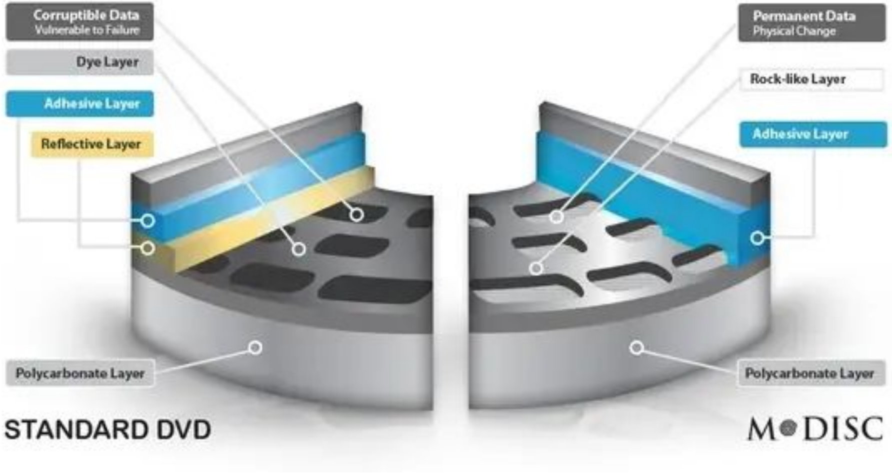
SERL™

Medi Disc

AZO™

Hard coat: A scratch resistant coating
SERL (super eutectic recording layer): Noise free recording on RW media.
Medi Disc: It meets a standard for the medical industry (patient record archiving, etc).
AZO: A better organic dye with more UV resistance.
“Archival grade”: Probably has some tech that offers better longevity.
DRL: We stuck some gold in there to protect the recording layer.

But what about … M-Disc!?



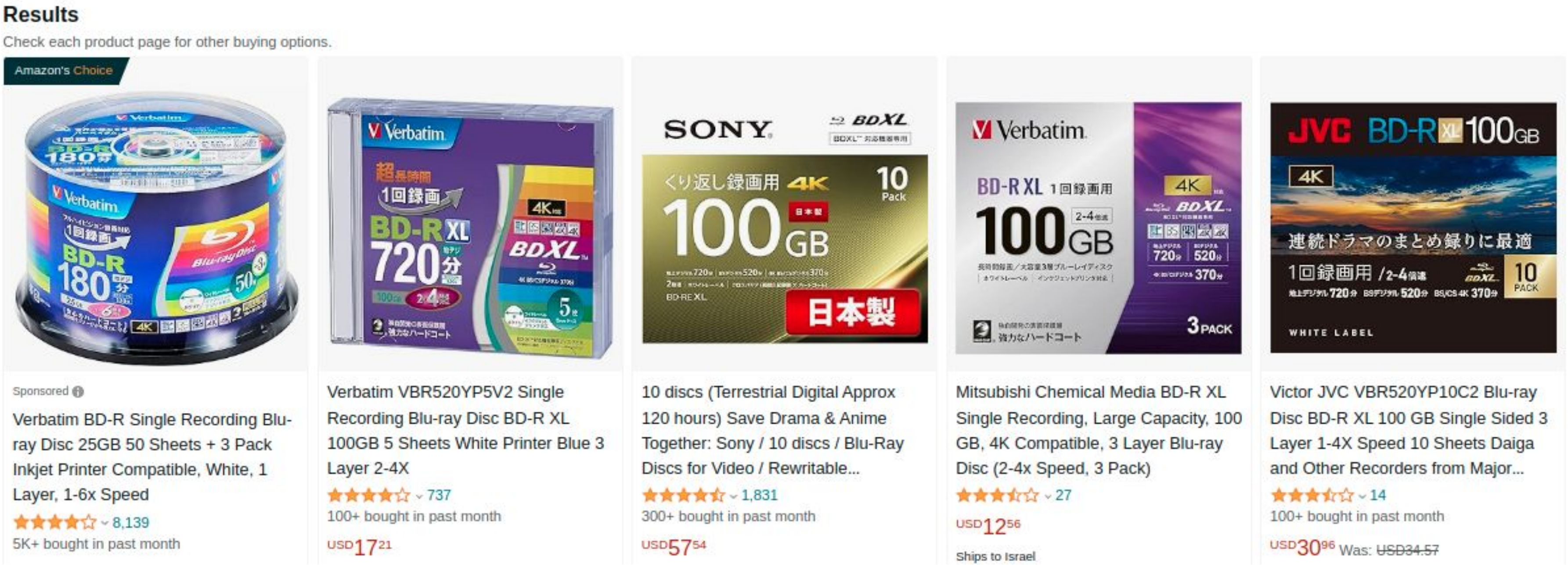
The M-Disc Controversy:

- M-Disc was invented by a startup that went bankrupt. The patented composition of the inorganic recording layer was sold to Verbatim and Ritek as sold licensees.
- Verbatim: “we’re going to keep making this for 10 years at least”
- “Rock like layer” = description of the inorganic materials used
- I have no idea how BD-R HTL and M-Disc BD differ substantively (haven’t received an answer from Verbatim at time of making this).
- Personally I use and trust M-Disc. Others choose not to. All approaches are okay.

The Biggest Optical Disc On The Market = 128GB

SONY
BDXL
BDXL™ 対応機器専用
1回録画用
4K
10 Pack
日本製
128GB
地上デジタル920分 | BSデジタル660分 | 4K BS/CSデジタル470分
2-4倍速 | ホワイトレーベル | ハードコート
BD-R XL
25 Pack

The biggest optical disc with multiple manufacturers are the 100GB BDXL discs (BD-TL or BD-QL both possible)



Results

Check each product page for other buying options.

Sponsored ⓘ

Verbatim BD-R Single Recording Blu-ray Disc 25GB 50 Sheets + 3 Pack Inkjet Printer Compatible, White, 1 Layer, 1-6x Speed

★★★★☆ 8,139

5K+ bought in past month

Verbatim VBR520YP5V2 Single Recording Blu-ray Disc BD-R XL 100GB 5 Sheets White Printer Blue 3 Layer 2-4X

★★★★☆ 737

100+ bought in past month

USD17.21

10 discs (Terrestrial Digital Approx 120 hours) Save Drama & Anime Together: Sony / 10 discs / Blu-Ray Discs for Video / Rewritable...

★★★★☆ 1,831

300+ bought in past month

USD57.54

Mitsubishi Chemical Media BD-R XL Single Recording, Large Capacity, 100 GB, 4K Compatible, 3 Layer Blu-ray Disc (2-4x Speed, 3 Pack)

★★★☆☆ 27

USD12.56

Ships to Israel

Victor JVC VBR520YP10C2 Blu-ray Disc BD-R XL 100 GB Single Sided 3 Layer 1-4X Speed 10 Sheets Daiga and Other Recorders from Major...

★★★☆☆ 14

100+ bought in past month

USD30.96 Was: ~~USD34.57~~

Cool thing to know: you can buy stuff from Amazon Japan!

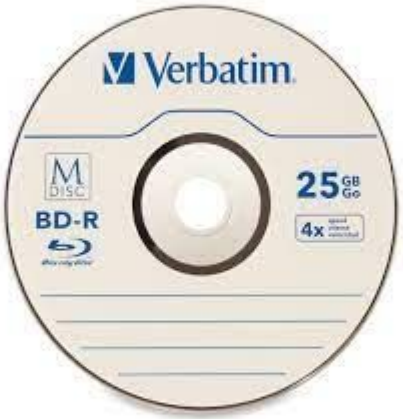
- Shipping is expensive but products are cheap and product selection is great so … it can work out .. especially if you buy in bulk (watch out for: customs and import fees!)
- Amazon Japan is a little bit like its own fiefdom. You need to supply proof of residence.
- Logistics = DHL and reputedly very fast.
- Nice way to get products that are hard to find in the West.

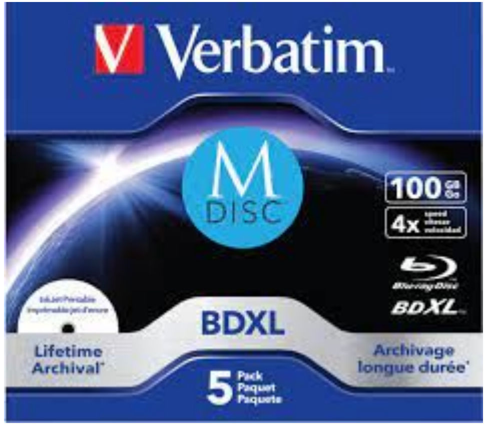
amazon.co.jp

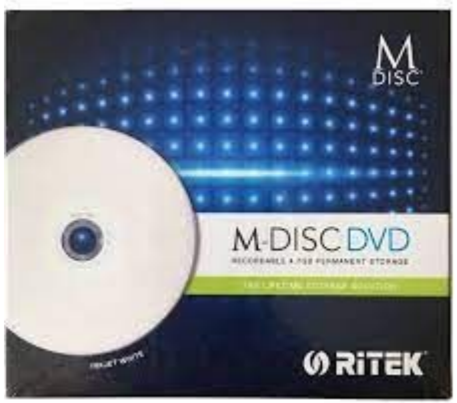
The deprecation worry and why I’m not worried

- Optical use cases remain valid and the purchasing market remains reasonably strong (judging by Amazon purchasing data).
- Floppy discs have very few redeeming qualities (tiny capacities, subject to data rot). And yet it’s still easy to buy floppy discs and floppy drives.
- Backwards compatibility comes after deprecation.
- Object of archival (my perspective): keep data safe on digital format A until ready to migrate to digital format B.
- My suggestions: consider buying a spare drive (or two) and reasonable quantities of whatever else you’re worried about.
- Supply issues will likely be a concern long before deprecation is.
- I reckon archival will keep the discs in use for a couple more decades at least.
- If you have thoughts leave them in the comments!

Here are my current product recommendations (date of upload)







For less valuable data I use regular HTL BD-R from Verbatim

- You can ECC and parity data but … a better approach is trying to pick good media.
- Crappy media is useful for testing burners but otherwise a false economy. Without naming names, I personally avoid 'bargain' brands.
- People are very opinionated about this so expect to hear conflicting opinions .. and the odd conspiracy theory

I’ve just ordered some Sony BD-R media from Amazon Japan.

- Japanese commenters seem pretty confident in Sony’s disc quality (and pretty suspect about a lot of alternatives).
- Sony invented the Blu Ray!
- The product claims archival longevity which is always my green flag (note: you won’t generally see this claim on ‘regular’ media)
- Not very commonly seen in Western markets

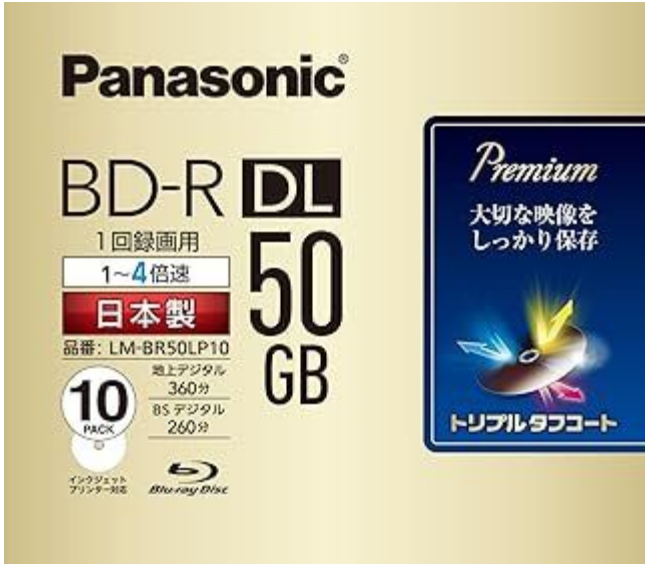
SONY
Blu-ray Disc
50 Pack
1回録画用
BD-R
25 GB
地上デジタル180分 / BSデジタル130分
1-4倍速
ホワイトレーベル（インクジェットプリンター対応）
ハードコート（100万回*の再生耐久）

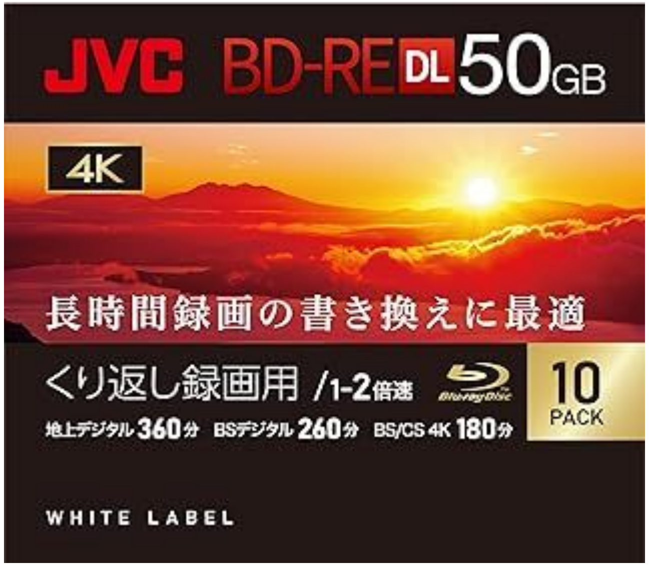
SONY
make.believe
ビデオ用
地上デジタル180分
ホワイトレーベル
インクジェットプリンター対応
10 PACK
Blu-ray Disc
BD-R
25GB
1-4倍速
1回録画用
100万回の再生耐久
ハードコート

SONY
Blu-ray Disc
5 枚入り
ブルーレイディスク
BD-R DL
1回録画用
DL 2層
50 GB
地上デジタル：360分
BSデジタル：260分
1-4倍速
ホワイトレーベル（インクジェットプリンター対応）
ハードコート（キズ・ホコリに強い）

SONY
make.believe
ビデオ用
地上デジタル180分
1-4倍速
パステルカラーレーベル
インクジェットプリンター対応/ワイドエリア
5 PACK
手書き用プレート付き
Blu-ray Disc
BD-R
1回録画用 25GB
キズ・ホコリに強い ハードコート
My Collection

Other options that seemed interesting to me:




JVC BD-RE DL 50GB
4K
長時間録画の書き換えに最適
くり返し録画用 /1-2倍速
Blu-ray Disc
10 PACK
地上デジタル 360分 BSデジタル 260分 BS/CS 4K 180分
WHITE LABEL

Concluding Thoughts

- Optical is a decent media for archival - especially archival products and especially the BDXL 100GB and 128 GB discs.
- Quality is imperative.
- Inorganic media is probably the way to go although there are some archival CDs and DVDs on the market.
- HTL vs M-Disc: reach your own conclusions.
- There are a couple of BDR products that make archival claims, especially on Japanese/Asian markets.
- Cheap optical media is a false economy. Remember: optical is zero maintenance costs so buy good discs.

Other nuggets of information that might be useful

- Veterans of online optical media spaces: redundancy and duplication is the best thing you can do to preserve important data. 3-2-1 is a good starting point. You can embellish upon that.
- You can scan for errors periodically. You can create checksums. You can write ECC data onto the disc that can be used for recovery later. But none of these things are necessary.
- There are some useful software packages for cataloging your optical physical media libraries. VVV on Linux. On Windows, there are a few options.
- Always worth double checking that your burner can do BDXL.
- Anecdotes: slimline external drives are less reliable than internal ones esp those with power supplies beyond bus power.